

## 5. Consumer Behavior

*Consumer Behavior : The process of how consumers behave in situations involving goods, services, ideas and experiences. Consumer behavior is about the behavior of consumers in different situations. The behavior that consumers display in searching for, purchasing, using, evaluating and disposing of products, services and ideas.*

- A discipline dealing with how and why consumers purchase (or do not purchase) goods and services.
- Consumer behavior can be thought of as the actions, reactions, and consequences that take place as the consumer goes through a decision-making process, reaches a decision, and then puts the product to use.
- The dynamic interaction of affect and cognition, behavior, and environmental events by which individuals conduct the exchange aspects of their lives ... the overt actions of consumers.

“*The American Marketing Association (AMA) defines consumer behavior as "The dynamic interaction of cognition, behavior and environmental events by which human beings conduct the exchange aspect of their lives."*

Consumer behavior is **"The study of individuals, groups, or organizations and the processes they use to select, secure, use and dispose of products, services, experiences, or ideas to satisfy needs and the impacts that these processes have on the consumer and society."**

Behavior occurs either for the individual, or in the context of a group (e.g., friend's influence what kinds of clothes a person wears) or an organization (people on the job make decisions as to which services the firm should use).

### Utility Analysis

Utility is synonymous with **"pleasure", "satisfaction" or "fulfillment of desire"**. It is psychological phenomenon. The concept of utility can be looked upon from two angles. From product angle and from consumer angle. From product angle utility is the want satisfying power of a commodity. From consumer's angle utility is psychological feeling of satisfaction, pleasure, happiness, or well-being which a customer derives from the consumption, possession or the use of commodity.

*In economics theory utility can be measured in two ways:*

- **Cardinal Utility** : Propounded by Marshall which is known as Marshaling Approach.
- **Ordinal Utility** : Propounded by Hicks & Allen which is known as Indifference curve Analysis.

### Cardinal Utility

*Neo-Classical economist Alfred Marshall believed that like height, weight, length, temperature, air pressure etc. Utility is also cardinally or quantitatively measurable in numbers 1,2,3 and so on.*

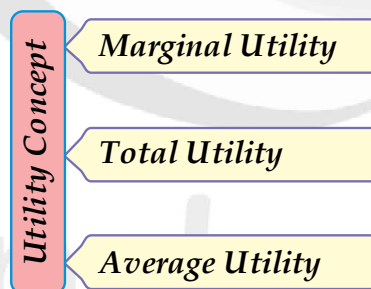
Marshall introduced a hypothetical unit called as “**Utils**” to measure utility. He assumes that **marginal utility of money remains constant**. Marginal utility of money refers to “worth of a rupee” or the utility derived by spending one rupee of money.

### Assumption

1. **Rationality** : It is assumed that the consumers are rational, and they satisfy their wants in the order of their preference. This means they will purchase those commodities first which yields the highest utility and then the second highest and so on.
2. **Limited Resources (Money)** : The consumer has limited money to spend on the purchase of goods and services and thus this makes the consumer buy those commodities first which are necessities.
3. **Maximize Satisfaction** : Every consumer aims at maximizing his/her satisfaction for the amount of money he/she spends on the goods and services.
4. **Utility is Cardinaly Measurable** : It is assumed that the utility is measurable in numbers like 1, 2 and 3.
5. **Diminishing Marginal Utility**: This means, with the increased consumption of a commodity, the additional utility derived from each successive unit goes on diminishing. This law holds true for the theory of consumer behavior.
6. **Marginal Utility of Money is Constant** : It is assumed that the marginal utility of money remains constant for a consumer irrespective of the level of a consumer’s income.
7. **Utility is Additive** : The cardinality believe that not only the utility is measurable but also the utility derived from the consumption of different commodities are added up to realize the total utility.

Thus, the cardinal utility approach is used as a basis for explaining the consumer behavior where every individual aims at maximizing his/her utility or satisfaction for the amount of money he spends on the consumption of goods and services.

### Concept of Utility



#### (a) Marginal Utility

*The Marginal Utility refers to the additional benefit (utility) a consumer derives from the consumption of one additional unit of good or service.*

In other words, marginal Utility is the rate of change in total utility per unit change in the quantity of the good consumed.

**Marginal Utility = Change in total utility / Change in number of units consumed**

Marginal Utility is also known as “marginal satiety”. It can be expressed as :

**Focus  
Formula**


$$MU = \frac{\Delta TU_x}{\Delta Q_x}$$

where MU = Marginal Utility

$\Delta TU_x$  = Changing in Total Utility

and  $\Delta Q_x$  = Change in Quantity Consumed by 1 Unit.

**(b) Total Utility**

Total utility is the aggregate level of satisfaction or fulfillment that a consumer receives through the consumption of a specific quantity of good or service. Each individual unit of a good or service has its own Marginal Utility and the Total Utility is simply the sum of all the marginal utilities of the individual units. Classical economic theory suggests that all consumers want to get the highest possible level of total utility for the money they spend. The formula to calculate total utility is as follows :

$$TU_x = \sum MU_n$$

A point of saturation is represented by the maximum level of the total utility. However as the concept of total utility is subjective it is very difficult to measure.

**(c) Average Utility**

Average utility is yet another concept of utility. Average utility is total utility derived per unit of consumption. It is derived by dividing the total utility by the total units consumed. The formula of average utility is as follows :

**Focus  
Formula**

**Average Utility**

$$\text{Average Utility} = \frac{\text{Total Utility of The Product}}{\text{Total Units Consumed}}$$

$$AU = \frac{TU}{n}$$

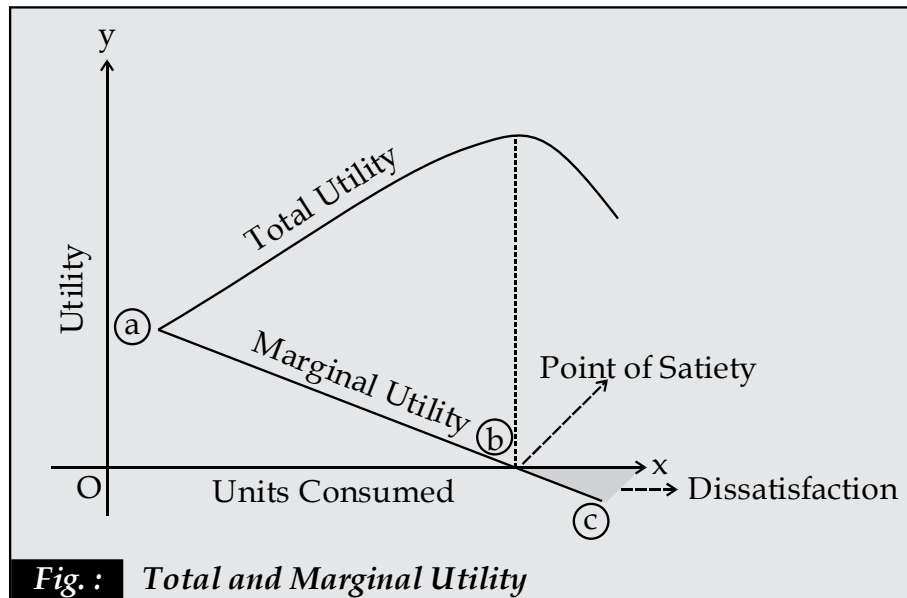
**Total Utility and Marginal Utility**

- Total utility refers to the complete amount of satisfaction gained.
- Marginal utility refers to the additional satisfaction gained from an extra unit consumed.
- If the marginal utility of the last item is positive, then total utility will be increasing.
- If the marginal utility of the last consumption is negative, total utility will be decreasing.

Example of Marginal and Total Utility for Food consumption

Quantity (Q)	Total Utility TU	Marginal Utility MU
1	30	30
2	55	25
3	75	20
4	90	15
5	98	8
6	98	0
7	88	- 10
8	63	- 25

- Total utility increases at diminishing rate as marginal utility decreases with every additional consumption.
- Total utility is maximized at the point where Marginal utility is zero. (Quantity 5 or 6)
- Total utility starts falling when marginal utility turns negative.



**Fig. :** Total and Marginal Utility

### Law of Diminishing Marginal Utility

Law of Diminishing Marginal Utility (DMU) states that as the quantity consumed of a commodity goes on increasing the marginal utility derived from each successive unit goes on diminishing. In simple words when a person consumes more and more units of a commodity per unit of time keeping the consumption of all other commodities constant the utility which drives from each successive unit goes on diminishing.

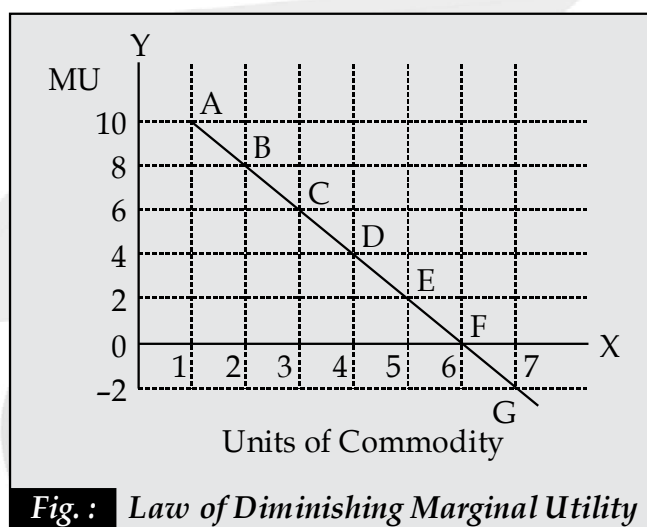
“According to Marshall, “The additional benefit a person derives from a given increase of his stock of a thing diminishes with every increase in the stock that he already has.”

#### Assumptions of the Law :

- All the units of a commodity must be homogeneous (same) in all respects.
- The unit of the good must be standard.
- There should be no change in the taste of the consumer during the process of consumption.
- There must be continuity in consumption.
- There should be no change in the price of the substitute goods during consumption.
- There should be no change in the price of the commodity during consumption.

Example :

Quantity (Q)	Total Utility (TU)	Marginal Utility (MU)
1	30	30
2	55	25
3	75	20
4	90	15
5	98	8
6	98	0
7	88	- 10
8	63	- 25



**Saturation Point :** The point where the desire to consume the same product becomes zero. *At this point marginal utility turns negative and total utility is maximum.*

**Disutility :** *If you still consume the product after the saturation point, the total utility starts to fall as marginal utility turns negative.* This is known as disutility. It will result in dissatisfaction.

In the above example, when we consumed the 6<sup>th</sup> apple, we are at our **saturation point**. If we consume another apple, i.e. 7<sup>th</sup> apple, we can see that the marginal utility curve has fallen to below X-axis, which is also known as '**disutility**'.

### Law of Equi-Marginal Utility

The Law of Equi marginal utility was presented in 19<sup>th</sup> century by an Australian economists **H. H. Gossen**. It is also known as law of maximum satisfaction or law of substitution or Gossen's second law.

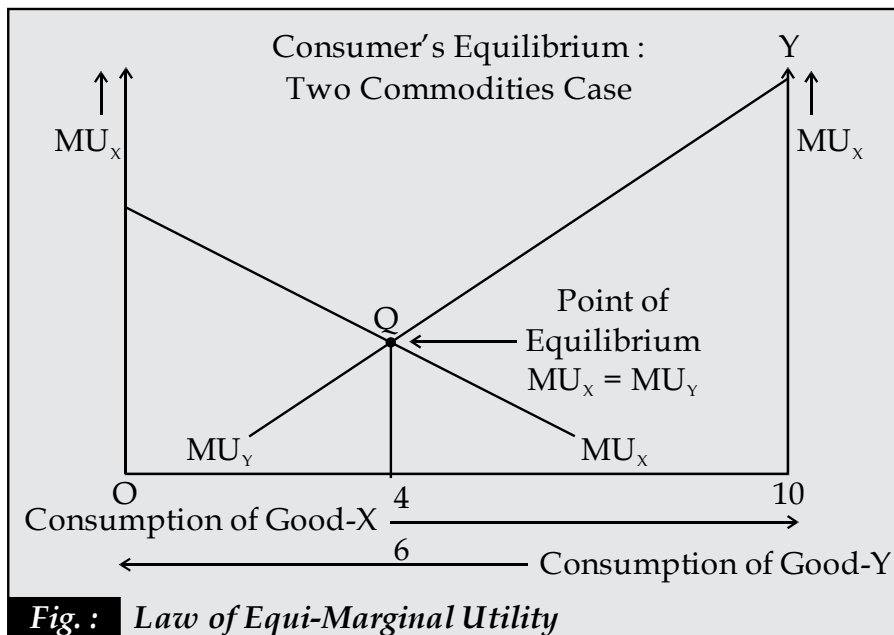
A consumer has number of wants. He tries to spend limited income on different commodities in such a way that marginal utility of all commodities is equal. When he buys several commodities with given money income, he equalizes marginal utilities of all such commodities.

“The law of Equi Marginal Utility is an extension of the Law of diminishing marginal utility. The law states that the consumer can get maximum utility by allocating income among commodities in such a way that last rupee spent on each commodity provides him the same marginal utility.



“A person can get maximum utility with his given income when it is spent on different commodities in such a way that the marginal utility of money spent on each item is equal”.

It is clear that consumer can get maximum utility from the expenditure of his limited income. He should purchase such amount of each commodity that the last unit of money spend on each item provides same marginal utility.



### Assumptions of the Law of Equi Marginal Utility

1. There is no change in the prices of the goods.
2. The income of consumer is fixed.
3. The marginal utility of money is constant.
4. Consumer has perfect knowledge of utility obtained from goods and aims at maximization of his satisfaction.
5. The utility is measurable in cardinal numbers.
6. Consumer has many wants.
7. The goods are substitutes of each other.

### Cardinal Approach to Consumer Equilibrium

Conceptually *a consumer reaches his equilibrium position when he has maximized the level of his satisfaction* given his resources and other conditions. A consumer is said to be in equilibrium when he allocates his expenditure in such a way that the last unit of money spent on each commodity yields the same level of utility.

The concept of how consumer reaches his equilibrium can be further comprehended through the one-commodity model, two-commodity model and multiple commodity model.

#### 1. Consumer's Equilibrium - One Commodity Model

Suppose a consumer with a given amount of resources (money) consumes a single commodity, say X. For a consumer, both his income and commodity X will have respective utilities and he can either retain his income in the form of asset or can exchange it for the commodity X. If the marginal utility of commodity X ( $MU_X$ ) is greater than the marginal utility of money ( $MU_m$ ), then a utility-maximizing consumer will exchange his money income for a

commodity. Based on the assumption, the marginal utility of a commodity is said to be declining with each successive unit and whereas the marginal utility of money remains constant, therefore the consumer will spend his money income on commodity X as long as  $MU_x > P_x(MU_m)$ . The  $P_x$  is the price of the commodity and  $MU_m$  is marginal utility of money. The consumer will stop his consumption when  $MU_x < P_x(MU_m)$ .

Thus, the consumer reaches his equilibrium when,

$$MU_x = P_x(MU_m)$$

or 
$$\frac{MU_x}{P_x} = MU_m$$

**Example :** Let marginal utility of money for the consumer = 4 utils (referring to the utility he expects to receive when he spends ₹ 1).

Let X be the commodity he intends to buy.

Let  $P_x$  (Price of X) = ₹ 4 per unit.

Marginal Utility Schedule of X is taken to be as follows :

**Table : Marginal Utility Schedule of Commodity-X**

Unit of Commodity-X	$MU_x$ (Utils)
1	20
2	18
3	16
4	10
5	0
6	- 5

Using the scale the 4 util = ₹ 1, he can express  $MUX$  in terms of rupees, as in Table.

**Table : Conversion of MUX into Rupees or Money Worth of MU**

Units of Commodity-X	$MU_x$ (Utils)	MU in Terms of Rupees (Money Worth of MU) When 4 Utils = ₹ 1
1	20	$20 \div 4 = 5.0$
2	18	$18 \div 4 = 4.5$
3	16	$16 \div 4 = 4.0$
4	10	$10 \div 4 = 2.5$
5	0	$0 \div 4 = 0$
6	- 5	$- 5 \div 4 = -1.25$

Now comes the basic question: **How many units of X the consumer will purchase to be in a state of equilibrium?** To answer this question, let us proceed step by step:

- Will he buy 1st unit of X?

Yes. Because :

$$MU_x = 20 \text{ utils}$$

$$= \text{Worth ₹ 5, while } P_x = ₹ 4$$

$$\left[ \begin{array}{l} 4 \text{ utile} = ₹ 1 \\ \therefore 20 \text{ utils} = \frac{20}{4} = ₹ 5 \end{array} \right]$$

What he pays (₹ 4) is less than what he gets (worth ₹ 5). Hence, he must buy the 1<sup>st</sup> unit of X.

Yes. Again, because:

$$\begin{aligned} MU_x &= 18 \text{ utils} \\ &= \text{Worth ₹ 4.5, while } P_x = ₹ 4 \end{aligned}$$

What he pays (₹ 4) is less than what he gets (worth ₹ 4.5). Hence, he must buy the 2<sup>nd</sup> unit of X. Continuing like this, he will stop buying X, only when :

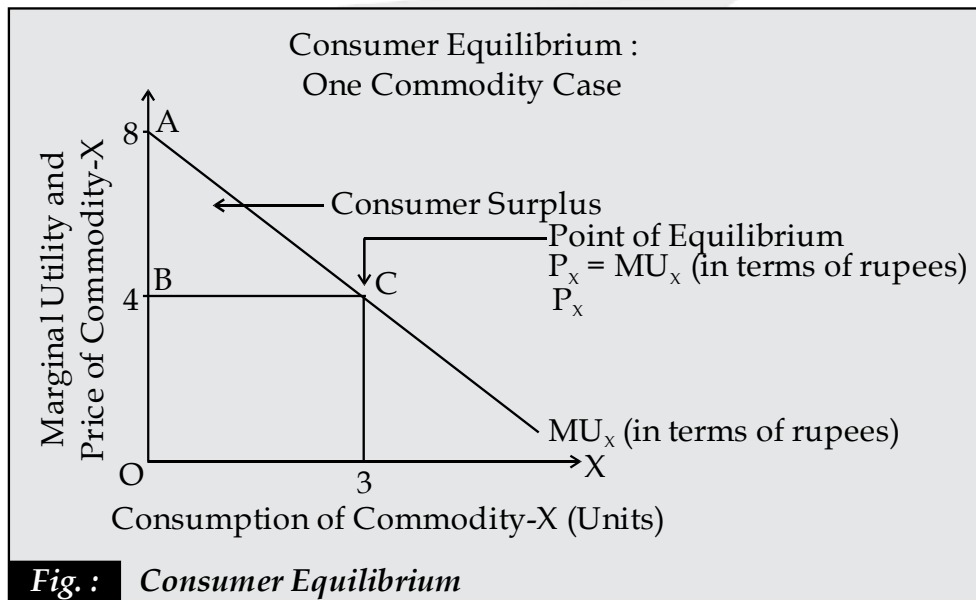
$$MU_x \text{ (in terms of rupees)} = P_x$$

It occurs when the consumer buys 3 units of commodity-X. Here,

$$MU_x \text{ (in terms of rupees)} = P_x = ₹ 4$$

### Diagrammatic Illustration

Fig., shows consumer equilibrium when only one commodity is purchased.



- Equilibrium is struck at point C when 3 units of commodity-X are purchased.
- Corresponding to point C, the price that the consumer is willing to pay for a unit of the commodity exactly matches with the price that he actually pays (= ₹ 4).
- Area ABC reflects consumer surplus. It is maximum in a state of consumer equilibrium. [It is equal to money saved by the consumer when:

$$\begin{array}{ccc} \text{Money Value of } MU_x & > & P_x \\ \uparrow & & \uparrow \\ \text{Price he is willing to pay} & & \text{Price he actually pays] \end{array}$$

[**Note :** Fig., is NOT based on the data from Table. We have drawn a smoothed  $MU_x$  curve to keep the diagram simple.]

Note the following observations carefully with reference to Fig.,

- $MU_x$  is a downward sloping curve showing that  $MU_x$  declines as consumption of X increases. (This is in accordance with the law of diminishing marginal utility).
- $P_x$  indicates market price of commodity-X. It is fixed for the consumer and is taken to be equal to ₹ 4.
- Each point on  $MU_x$  curve shows that  $MU_x$  in terms of money. It indicates the price that the consumer is willing to pay for each successive unit of the commodity.



- (iv) Equilibrium is struck at point C when the price he is willing to pay is exactly equal to the price he actually pays. In a state of equilibrium, the consumer buys 3 units of commodity-X.
- (v) So long as the price he is willing to pay is greater than the price he actually pays, the consumer makes a gain which is called consumer surplus.
- (vi) In a state of equilibrium, consumer surplus is maximum. It is equal to area ABC in Fig.

As per the graph,  $P_x(MU_m)$  is the horizontal line which shows the constant utility of money, whereas the  $MU_x$  is a downward sloping curve which shows the diminishing marginal utility of commodity X. The  $P_x(MU_m)$  line and  $MU_x$  curve intersect at point  $E_1$ , which indicates that at quantity  $OQ_1$ ,  $MU_x = P_x(MU_m)$ . Therefore, the consumer is said to be in equilibrium.

Any point above  $E_1$ , the  $MU_x > P_x(MU_m)$  the consumer will exchange money for commodity X since the marginal utility of the commodity is greater than the marginal utility of money, his satisfaction level will increase. Whereas any point below the equilibrium point " $E_1$ " the consumer loses utility and hence can compensate by reducing his consumption of commodity X.

## 2. Consumer's Equilibrium - Two Commodity Model

The single commodity model is based on the unrealistic assumption that the consumer consumes a single commodity but, however, in real life, the consumer consumes a large number of goods and services. This model talks about how the consumer consuming two commodities reaches his equilibrium.

It is assumed that the consumer has a limited money income and that the utility derived from two commodities are subject to diminishing returns. Also, several commodities yields different levels of marginal utility, such as some yield higher MU while others yield less MU as compared to the others. Thus, the rational and utility-maximizing consumer will select commodities on the basis of their utilities. This means the consumer will first buy those commodities which yield the highest utility, then the second highest and so on.

The consumer will allocate his expenditure in accordance with the MU of the commodities. He will continue to switch his expenditure from one commodity to another until he reaches a stage where last penny spent on each commodity yields the same utility. As discussed earlier, this is known as the Law of Equi-Marginal Utility.

Let's understand the consumer's equilibrium in the case of two commodities. Suppose a consumer consumes two commodities, say X and Y for the given level of his income and other conditions. Following the equilibrium rule of the single commodity model, the consumer will allocate his income in both the commodities

$$MU_x = P_x(MU_m)$$

$$MU_y = P_y(MU_m)$$

On the basis of the assumption that MU of money remains constant, a consumer reaches his equilibrium when:

$$\frac{MU_x}{P_x(MU_m)} = 1 = \frac{MU_y}{P_y(MU_m)}$$

The above equation can be rewritten as:

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = MU_m$$

### 3. Consumer's Equilibrium – Multi Commodity Model

The logic that a consumer strikes his equilibrium for a set of two commodities X and Y when  $\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$  can be extended to any number of commodities. The equilibrium equation for 'n' number of commodities would be as under :

$$\frac{MU_1}{P_1} = \frac{MU_2}{P_2} = \frac{MU_3}{P_3} = \dots = \frac{MU_{nth}}{P_{nth}} = MU_m$$

#### Ordinal Utility (Indifference Curve Analysis)

**J.R. Hicks and R.G. D. Allen** hold the view that utility is not quantitatively measurable – it is not measurable in absolute terms. **Utility can be expressed only ordinally like 'Less or More' or 'High or Low'**. Ordinal utility approach is purely subjective and Immeasurable. *The theory of consumption is based on the scale preference and the ordinal ranks or orders of preference.*

The ordinal utility approach differs from the cardinal Utility approach (also called classical theory) in the sense that the satisfaction derived from various commodities cannot be measured objectively.

**Ordinal theory is also known as neo-classical theory of consumer equilibrium, Hicksian theory of consumer behavior, indifference curve theory and optimal choice theory.** This approach also explains the consumer's equilibrium who is confronted with the multiplicity of objectives and scarcity of money income.

The modern economists have discarded the concept of cardinal utility and instead applied ordinal utility approach to study the behavior of the consumers. While the neo-classical economists believed that the utility can be measured and expressed in cardinal numbers, but the modern economists maintain that the utility being the psychological phenomena cannot be measured theoretically, quantitatively and even cardinally.

#### Assumptions of Indifference Curve Analysis of Consumer's Equilibrium

1. Only **two goods** are taken into the consideration which are substitutes of each other. It is assumed that the customer has to make a choice between two goods, provided their prices remains constant.
2. It is assumed that the **customer is not saturated** with both the commodities and look for more benefits from these two, to have a higher curve to have more satisfaction.
3. The **satisfaction level cannot be measured**; thus, the customer ranks his preferences.
4. It is assumed that the **marginal rate of substitution diminishes**, as more units of one good have to be set off by the reduction in the units of the other commodity. Thus, the indifference curve is convex to the origin.
5. It is assumed that the **consumer is rational** and will make his choice objectively to have an increased utility and the satisfaction.
6. Money income of the consumer is given and constant.
7. More of a good always gives more satisfaction to the consumer. This is also known as monotonic preference of the consumer.

## Indifference Set

It is a set of those combinations of two goods which offer the consumer the same level of satisfaction. The consumer is indifferent across all combinations in his indifference set. Since all the combinations in an indifference set provide same level of satisfaction, the consumer prefers them equally.

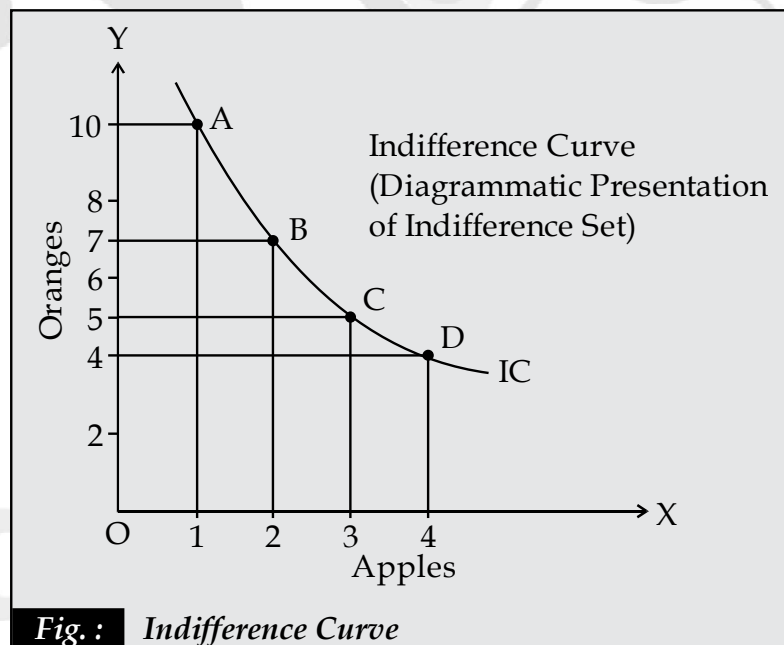
Combination	Number of Apples	Number of Oranges
A	1	10
B	2	7
C	3	5
D	4	4

## Indifference Curve

An indifference curve graphically represents an Indifference Set or all those combinations of goods which give same level of satisfaction to the consumer. In other words, it is the locus of all such points which show different combinations of two commodities, offering same level of satisfaction to the consumer.

“ According to Prof. A.L. Mayors "An indifference schedule may be defined as a schedule of various combinations of goods that will be equally satisfactory to the individuals concerned. If we depict this in the form of a curve, we get indifference curve"

According to Prof. J.K. Simith "It is the locus of Point representing pairs of quantities between which individuals is indifferent" so it is termed as Indifference Curve.

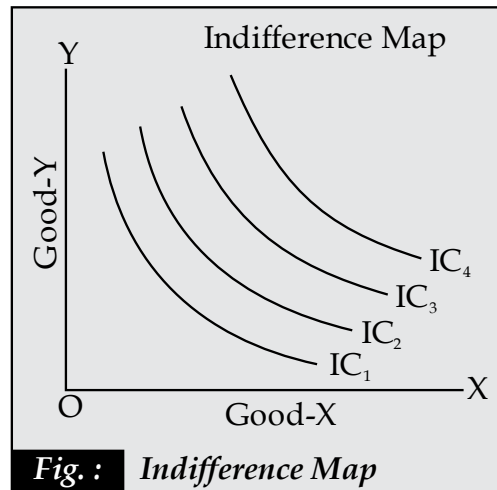


**Fig. :** Indifference Curve

Each point on the curve A, B, C, D,..... shows a different combination of two goods, Apples and Oranges which offers same level of satisfaction to a consumer.

## Indifference Map

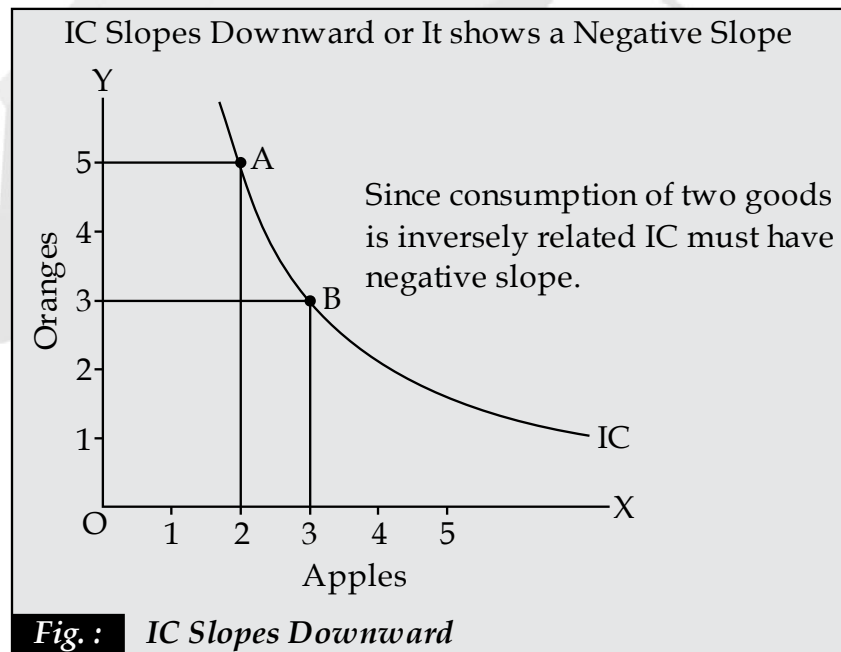
The **Indifference Map** is the graphical representation of two or more indifference curves showing the several combinations of different quantities of commodities, which consumer consumes, given his income and the market price of goods and services.



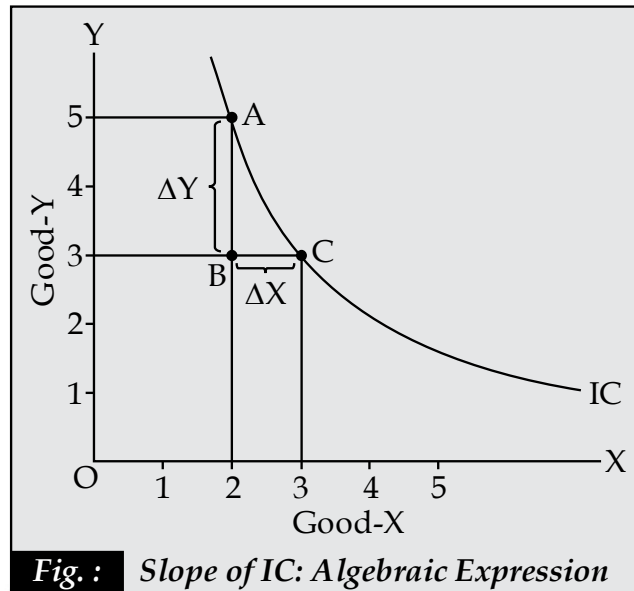
### Properties of Indifference Curves

#### (i) IC Slopes Downward

IC slopes downward from left to right. It means that IC has a negative slope. It implies that if the consumer decides to have more one good, he must have less of the other.



## Slope of IC: Algebraic Expression



$$\text{Slope of IC} = \frac{\Delta Y}{\Delta X}$$

$$= \frac{AB}{BC} = (-) \frac{2}{1}$$

$$= (-) 2$$

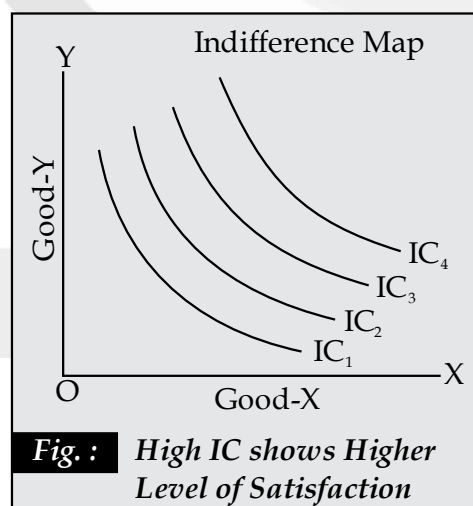
[Consumption of one additional unit of Good-X involves a sacrifice of 2 units of Good-Y]

Since consumption of two goods is inversely related, IC must have negative slope, or it must slope downward.

### (ii) IC is Convex to the Origin

It means that the slope of IC tends to decline, as we move along the IC from left to right.

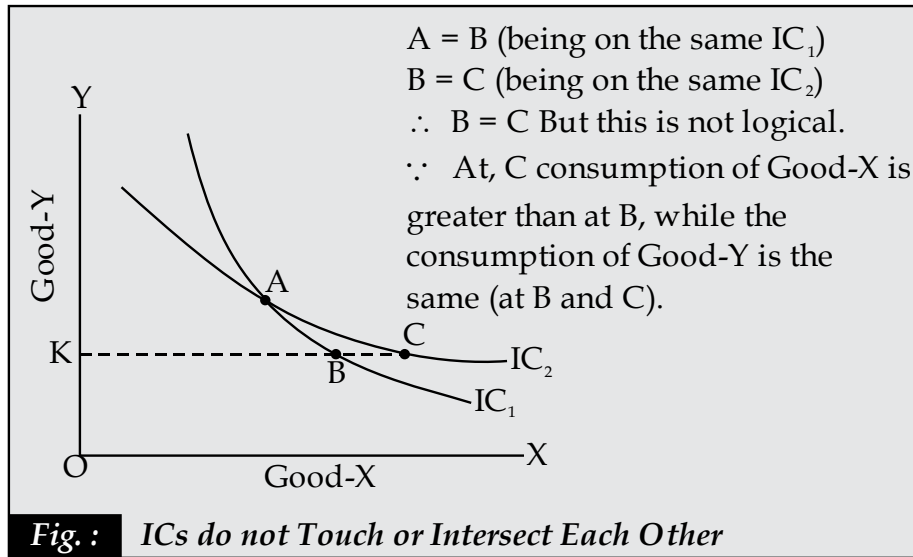
### (iii) High IC shows Higher Level of Satisfaction



Higher IC (to the right and above another IC) indicates higher level of satisfaction. Thus,  $IC_4$  indicates higher level of satisfaction than  $IC_3$ ;  $IC_3$  indicates higher level of satisfaction than  $IC_2$ , and  $IC_2$  indicates higher level of satisfaction than  $IC_1$ .

Each IC in the indifference map corresponds to different level of consumer's income. Higher IC corresponds to higher level of income.

**(iv) ICs do not Touch or Intersect Each Other**



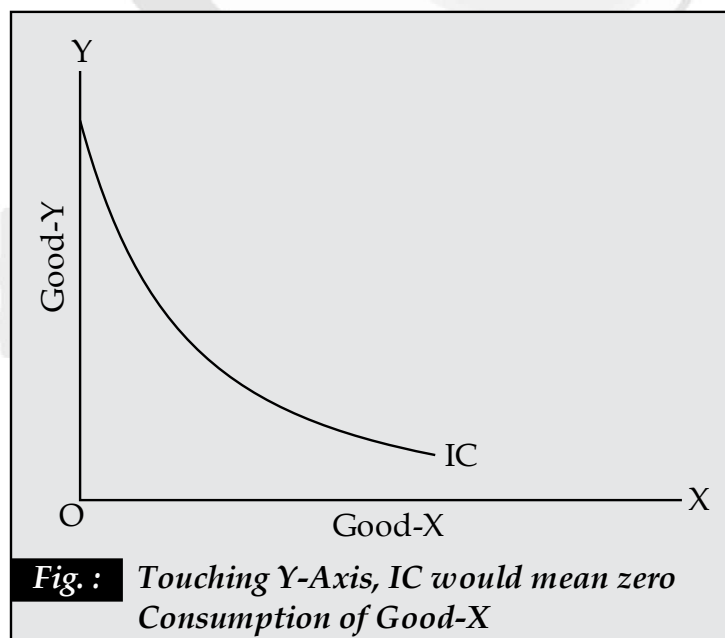
Consider points A and B. These are on the same  $IC_1$ . Therefore, these are equal in terms of the level of satisfaction. So that  $A = B$ . Likewise  $A = C$ , as these are on the same  $IC_2$ .

Since  $A = B$  and  $A = C$ , we can conclude that  $B = C$ . But this is not logical. Because: both at B and C, the consumption of Good-Y is the same ( $= OK$ ). But at C, the consumption of Good-X ( $= KC$ ) is greater than at B ( $= KB$ ). Implying that C must be offering higher level of satisfaction than B.

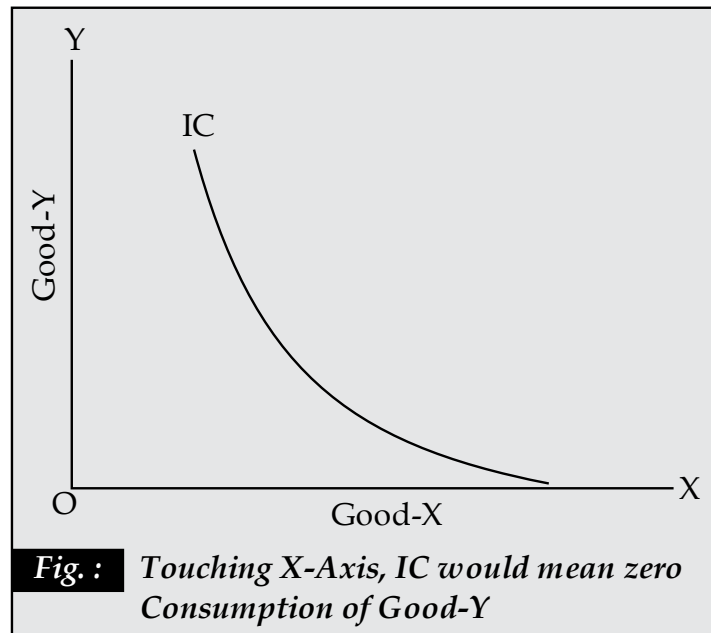
**(v) IC does not touch X-axis or Y-axis**

This is because IC analysis considers the consumption of two goods. If IC touches Y-axis (as in Fig.), it would mean that the consumption of Good-X is zero.

Likewise, if IC touches X-axis (as in Fig.), it would mean that the consumption of Good-Y is zero.







### Budget Set

It refers to the attainable combinations of a set of two goods, given the prices of goods and income of consumers. **It is also known as budget constraint** as it shows the limit up to which the consumer can buy a set of two goods with his given income.

$$P_1X_1 + P_2X_2 \leq Y$$

Here,  $P_1$  = Price of Good-1

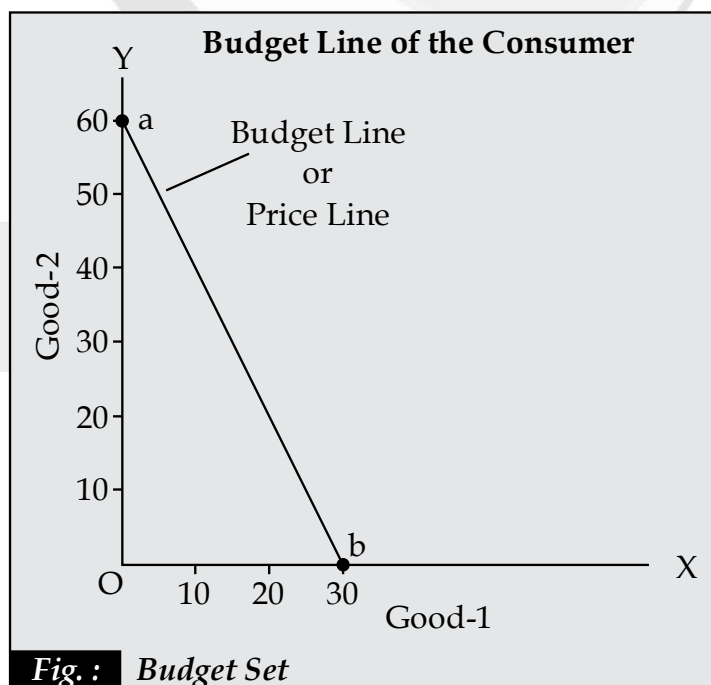
$X_1$  = Quantity of Good-1

$P_2$  = Price of Good-2

$X_2$  = Quantity of Good-2

$Y$  = Total expenditure or total budget.

Budget Set is also called **Budget Constraint** as it shows the limit (constraint) up to which the consumer can buy a set of two goods with his given income.



## Budget Line

The budget line represents the different possible combinations of available commodities that a consumer can purchase given his level of income and the market price of goods and services. Anywhere on the budget line, a consumer is spending his entire income either on Good-1 or on Good-2 or on both Good-1 and Good-2. It is also known as price line. Budget line separates attainable combinations from the non-attainable combinations. A consumer cannot go beyond his budget line.

Units of Good-1	Units of Good-2
0	60
10	40
20	20
30	0

## Ordinal Approaches to Consumer Equilibrium

The **Ordinal Approach to Consumer Equilibrium** asserts that the consumer is said to have attained equilibrium when he maximizes his total utility (satisfaction) for the given level of his income and the existing prices of goods and services. The ordinal approach defines two conditions of consumer equilibrium :

- Necessary or First Order Condition and,
- Supplementary Second Order Condition.

### Necessary Condition or First Order Condition

Under the first order condition, the consumer reaches his equilibrium in the same manner as he does under the cardinal approach of the two-commodity model. It is expressed as:

$$\frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$$

By implication,

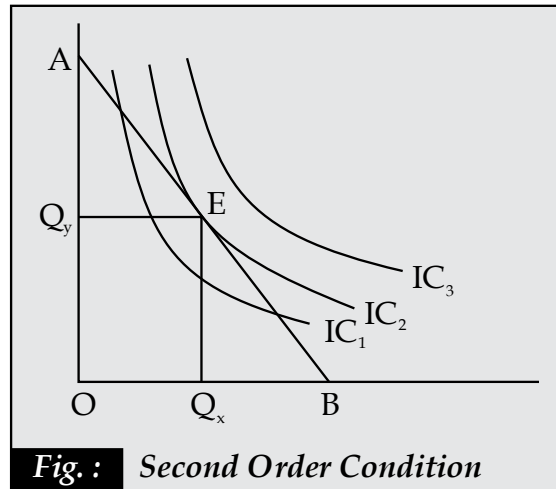
$$\frac{MU_X}{MU_Y} = MRS_{X,Y}$$

Thus, the necessary condition of the cardinal approach to consumer equilibrium can be written as :

$$MRS_{X,Y} = \frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$$

The above condition shows that the rate at which the consumer is willing to substitute Good-X for Good-Y coincides with the rate at which the market allows the consumer to substitute Good-X for Good-Y.  $MRS_{X,Y}$  is the slope of indifference curve and  $\frac{P_X}{P_Y}$  is the slope of budget line.

**Supplementary or Second Order Condition :** The first order condition is necessary but not sufficient. Thus, the second order or supplementary condition requires that the necessary condition must be accomplished at the highest possible indifference curve on the indifference map. **At the point of equilibrium, the indifference curve must be convex to the origin.**



In the figure above, there are three indifference curves, Viz.  $IC_1$ ,  $IC_2$ , and  $IC_3$  presenting a hypothetical indifference map of the consumer.  $AB$  is the hypothetical budget line. At point 'E', the indifference curve  $IC_2$  and Budget line  $AB$  intersect and hence, therefore, the slope of  $IC_2 = AB$ . At this point, both the necessary condition and the supplementary condition get fulfilled, and hence, the consumer attains equilibrium at point 'E'.

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